

Honeybees

Market for pollination services grows

BY BETTY JOYCE NASH

Only a beekeeper would move to South Carolina for the pollen. But Chuck and Karen Kutik of Manning, S.C., count on it to help feed their livestock — 2,500 to 3,000 hives of honeybees. Bees mix pollen and nectar to make food (beebread). A summer hive, or colony, at peak can hold as many as 80,000 bees. The Kutiks pack bees off to California almond fields in February, apple orchards in New York in May, and blueberry fields in Maine in late spring with vegetable and fruit stops along the Atlantic seaboard in the summer.

Charles Hatley of Concord, N.C., also rents hives. “You want to try to keep your bees busy.” His bees, in mid-April, were foraging for nectar in the raspberry fields of Stanly County, N.C., before heading to blueberry and blackberry fields.

Beekeepers like Hatley and the Kutiks are part of a growing market for pollination services that has expanded over the past century, especially since the 1980s when wild bee populations began to vanish. Farmers can’t rely on or manage other pollinators — birds, other types of bees, butterflies, wind, or water. Honeybees forage across flowering plants, improving quality and yields for farmers, while the bees process the blossom nectar into honey, a boon for the beekeeper if the weather, temperatures, and blossoms cooperate. Pollination services can be found throughout the nation and are estimated to be worth \$15 billion annually. Honeybees are vital to North Carolina’s \$48 million blueberry crop, \$28 million apple crop, and myriad vegetables and crops like alfalfa, cotton, peanuts, and soybeans.

Commercial pollination markets have been well established since at least the 1940s. Yet research into the economics of the honeybee and its role in agriculture continues to flourish as hive numbers fall and demand for pollination grows.

Bees and Economic Thought

Honeybees also have appeared in economic theory. Imagine adjacent property owners, a beekeeper and apple farmer. Economist J. E. Meade suggested in a 1952 paper that beekeeping is an “unpaid factor” in apple production because neither farmer nor beekeeper arranged pollination or honey-making services in spite of mutual benefits to the bees’ stamen-to-pistil pollen deposits. Theory suggests that, absent an agreement over compensation, the farmer will neither arrange for optimal beekeeping services nor the beekeeper establish the number of hives that would maximize the farmer’s return on apples. In that case, there is an argument that bee pollination services — or the reverse, nectar provision services — would be “under-provided” by the market.

Nectar provision and bee pollination are a “reciprocal externality,” according to those early papers, both drawing on the work of economist A.C. Pigou who in 1920 had defined the concept of negative or positive side effects of a firm’s behavior and termed them “externalities.” His theory conceptualized the costs that aren’t borne by the firm. Certain taxes might compensate for negative side effects while positive side effects, such as pollination and honey-making in the bee case, could be encouraged by a subsidy. (Such observations had minimal influence on honey price support policies at the time, but the U.S. honey program of the 1980s and 1990s was in fact designed to encourage bee and pollination services, according to research by economist Walter Thurman of North Carolina State University. Today, there are no price supports for honey, but trade rules govern some honey imports.)

In 1973, economist Steven N.S. Cheung in his paper “The Fable of the Bees,” described a functioning market with obvious transactions between beekeepers and farmers: Pollination services were listed in the *Yellow Pages* of rural, apple-growing Washington state, evidence that beekeepers rented hives. When he looked at pollination fees, he found buyers and sellers of these services. He concluded that “observed pricing and contractual arrangements governing nectar and pollination services are consistent with efficient allocation of resources.”

Cheung’s work drew on the now-famous paper by Ronald Coase published in 1960, “The Problem of Social Cost,” that, among other insights, pointed out that when property rights are well defined, firms generally will bargain among themselves to find an efficient solution.

Thurman explains that Cheung’s paper highlighted the need to understand the details, in this case, of the beekeeping and farming businesses. “While in principle the externalities exist, once people start contracting, there’s a market,” Thurman notes.

“Markets coordinate the joint production of pollination and honey in the face of dramatic variation in output prices, and do so against a backdrop of continually evolving scientific views on the efficacy of honeybee pollination,” according to a paper on the subject that Thurman co-authored. “Markets must also coordinate the delivery of pollination services to multiple crops during their blooming seasons, not perfectly forecastable.” That is no small task.

Coast-to-Coast Demand

Demand for hired hives grew along with knowledge about pollination benefits, which often depends on dissemination of the latest research. Other factors contributed, too, such

as the invention of the movable hive, and produced markets that expanded with transportation improvements like engines, trucks, and roads. “The costs of market exchange declined and the returns to specialization increased,” Thurman notes. Finally, the demise of wild bee colonies that began in the 1980s — probably from the appearance of the varroa mite, a dangerous parasite to honeybees — put more pressure on domestic honeybee colonies for pollination.

Honeybees have become essential in the production of certain crops, and nowhere is that more evident than in the almond groves of California. The science of pollination has led to varieties of crops that are ever more dependent on pollination, according to Thurman. The more a crop depends on pollination services, the more the farmers are willing to pay to rent bee colonies, and California’s Central Valley hosts the most vigorous market in the nation. In 2004 and 2005, almond acreage required an estimated 60 percent of the approximately 2.5 million hives in the United States. Dispatched by owners through brokers or trucked in by beekeepers, colonies are placed in February and early March to pollinate almonds, 80 percent of world supply, 1.5 billion pounds (shelled) in 2008. While the keepers also may arrange pollination services for other crops while they’re in California, the almonds are the primary and most lucrative crop. The bees may roam a couple of miles from the crops they’re supposed to pollinate. However, the effects are often negligible, and when this does occur it is probably on fields smaller than the vast almond groves.

When bees suck nectar via their long tongues, their sticky hind legs pick up pollen grains that are necessary to fertilize some plants. (Some crops like corn are self-pollinating and don’t require bees.) While much of that pollen returns to the hive with the bees in tiny pollen sacks, some is deposited as they land on flower blossoms. A honeybee’s work can make a difference, but that difference is hard to measure in money. For one thing, aggregate pollination data are not recorded, including even the fees paid to beekeepers, according to Thurman and co-authors Michael Burgett of Oregon State University and Randal Rucker of Montana State University, who have written a paper about pollination fees.

But Burgett has kept crop-by-crop summaries of an annual pollination survey of about 60 commercial beekeepers in Washington and Oregon since 1986. The survey captures the upward trend in demand for the service and increases in commercial beekeeping operations. The authors found that pollination fees rise according to costs — for example, accounting for the appearance of the varroa mite in 1991, which increased the price of rentals by about \$4.60 per colony. The authors also examined the value of honey produced during the pollination periods. Although some beekeepers like the Kutiks say that they don’t factor honey production into their pollination prices, the authors found fees in Washington and Oregon vary across pollinated crops. Ranking crops from vetch seed, which produces good honey, to almonds, which produce barely palatable honey, the



Bees pick up and deposit pollen as they forage across flowering plants, improving quality and yields. Farmers often hire honeybee hives to pollinate crops because wild bee populations have declined.

authors found the fees paid for a honey crop like vetch are lower than all fees reported for non-honey crops like almonds. Almond pollination prices are higher when honey production and pollination do not occur simultaneously.

The authors find the price of pollination services reflect “a complex array of knowledge of entomology, horticulture, environmental science, consumer preference, logistics, and world trade.”

Bee pests have reduced available supplies, especially in California, and so the demand for almond pollination continues to be reflected in prices, which Thurman cites as about \$130 per colony in 2006. He estimates fees paid to all U.S. beekeepers for all crops at about \$180 million in 2006 and increasing.

With an estimated 2.5 colonies per acre, and an increase of 25 percent in almond acreage from 1996 to 2004, economist Daniel Sumner and research specialist Hayley Borris of the University of California at Davis estimate hive requirements at roughly 1.4 million in 2004. By 2012, the almond crop may need about 2 million colonies.

Bee operators who migrate to California to pollinate almond blossoms may rent hives to fruit and vegetable growers along the way. After almonds, many move on to the Northwest for apple, pear, and cherry crops. During the summer, hives remain in the Midwest, home to the mega operations for honeybees. There, bees may frequent sunflower, clover, basswood, and various nectar sources to produce honey.

Higher prices are attracting beekeepers from as far away as the East Coast. The Kutiks sent their bees by truck to California for the first time in 2008 and again for the 2009 almond pollination. They contract with another beekeeper in California who unloads and then ships the bees back. “We lease our bees to another beekeeper who deals with the farmer,” Karen Kutik notes. “The bees are inspected to make sure they are the proper standard that the farmer expects for the money he pays. It was very lucrative

last year for us and this year too.”

Trucking was cheaper this year too. She says they get paid anywhere from \$90 to \$150 per hive — “what the guys are willing to pay.” Prices for pollination vary but “have been going up for the past few years.”

The Kutiks formerly rented bees to large-scale cucumber farmers in South Carolina but some of those customers have switched to other crops. And Karen Kutik says small fields aren’t a good fit for the business any longer.

The Kutiks ship bees to New York to pollinate apples in late April or early May for about \$55 per hive. “There are a lot more apple growers, and they’re not getting that much for their apples. It’s what the market will bear. Some guys [beekeepers] will rent for \$30 per hive.”

While the Kutiks’ business is going well, most aspects of the bee business are fickle. For instance, temperatures over the recent winter were too cold for nectar in South Carolina. “We have had to feed our bees this year,” Karen Kutik says. Weather can wreak havoc on pollination and honey production alike. When it rains or temperatures drop, the bees don’t forage. For instance, the bees may be out in the almond groves of California for a month and only fly 10 days, she explains.

The Kutiks depend on pollination services to round out their income, which also derives from honey and making “nucs,” the nucleus of a hive. Right now, honey is where the money is, she says. Honey prices have risen, in part because of a drought in major honey-producing countries and a smaller than average crop in 2008, according to the American Honeybee Producers Association. While there’s no explicit honey subsidy, there was a new \$2.63 per kilogram duty placed on Chinese honey in January.

Karen Kutik says they separate the honey production from the pollination services. For example, although blueberries make good honey, when they pollinate that crop in Maine, they “don’t even talk honey with them,” she says of the blueberry growers. “That’s a perk. It is not a sure thing. Honey-making isn’t ever a sure thing.” For instance, cool, rainy weather in the past two years have stymied basswood and locust honey production for the Kutiks. “It is feast or famine,” she says, of the bee business in general. “Right now

seems to be a good time. For a number of years we were too small.” She adds that they run between 2,500 and 3,000 hives, while among the Midwest bee operations, 10,000 is considered small.

Future of the Bee Business

While feral bees have vanished from the fields and forests, domestic bees are also struggling with a variety of mites and viruses. There are pest control options, but keeping hives healthy is tricky. Researchers are even examining the possibility that the migrations may weaken bee colonies, making them more susceptible to mites like varroa. Apiculturists are worried. Some losses are odd and include reports of bees failing to return to the hives and rapid colony losses for reasons that remain largely unknown, according to a 2008 report by the Congressional Research Service.

“The market for pollination services has grown and it has coincided with these infestations of exotic pests we’ve had,” says Don Hopkins, the state apiarist for North Carolina. The pests are one reason most states require inspections, certifications, and permits for incoming bees.

North Carolina has the most beekeepers of any state in the nation, but most keep the bees as hobbies or sideline businesses, like Charles Hatley. He has kept bees for 33 of his 45 years. With demand for pollination services ramping up, and bee populations in jeopardy, he wants to transform his sideline into a full-time operation. He currently breeds queen bees, good for disease resistance, for eventual sale. He places bees in a 400-acre forest of sourwood trees for a distinctive honey that can bring a price premium of up to 200 percent over other varieties. Hatley also rents hives to vegetable and fruit growers for about \$50 per colony for six weeks. He has drafted his own contract, one that specifies whether they use insecticides because he prefers to rent hives to organic farmers.

He now can’t keep up with demand. “I got a call from a farmer who wanted 600 colonies for watermelon and cucumber.” As research continues into colony collapse disorder and the various pests plaguing managed beehives, the demand for pollination intensifies. As he says, “This can get as big as I want it to get.”

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